Geospatial One Stop

Best Practices White Paper

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I. BACKGROUND

Geospatial One Stop is an Office of Management and Budget (OMB) sponsored E-Gov initiative that would more effectively organize, broaden and accelerate Federal Government plans to develop and provide improved access to geospatial data. Access to geospatial data would be provided at multiple levels of government and the private sector. Recognizing the value and need for Geospatial data, the costs of redundant data collection, the need for broader data collaboration, standards development work and access to data, OMB selected Geospatial One Stop as a high priority E-Gov initiative. Moreover, the ability of Geospatial One Stop to serve as an enabler of improved Homeland Security also highlights the importance of this initiative. Geospatial data can provide information regarding the location of critical infrastructure, hazardous materials, evacuation routes and other information that is highly valuable for emergency planning and response. Supplemented with computer aided design (CAD) drawings of building interiors, facility designs, etc., geographic information systems (GIS), can become even more effective for Homeland Security. Geospatial data collaboration with utilities, telecommunications companies and other private sector organizations can help assemble the necessary information for this important application.

Geospatial One Stop plans to build-on and accelerate Federal Geospatial data collaboration initiatives by accomplishing the following tasks:

1. Develop a Data Call or Inventory of Geospatial Data
2. Encourage Data Collaboration between the Feds and other sectors (e.g., state and local government, utilities, etc.)
3. Develop standards and the metadata and data content for the following seven framework Geospatial data types:

    - Digital Orthoimagery
    - Cadastral Data
    - Geodetic Control
    - Elevation
    - Hydrography
    - Transportation
    - Government Units

4. Develop web mapping standards and interfaces through the OpenGIS Consortium (a GIS consortium dedicated to the development of open and interoperable GIS standards)
5. Develop a One Stop portal to provide access to Geospatial Data.

Geospatial One Stop builds on Federal efforts to develop a National Spatial Data Infrastructure (NSDI) through the Federal Geographic Data Committee (FGDC). The FGDC, which is part of the Department of the Interior, coordinates geographic data standards and data collaboration for the Federal Government. Geospatial One Stop would enhance data collaboration initiatives currently being pursued by FGDC coordinated "I-Teams". With representatives from various levels of government, I-Teams develop Federal and state geographic data collaboration plans

which document opportunities and agreements to share and collaboratively fund the development of geospatial data. In addition, Geospatial One Stop would expand collaborative access to geospatial data currently being piloted through the USGS National Map Program pilot projects. The National Map Program uses current, detailed state and local government geospatial data to maintain a digital, updated version of USGS digital topographic maps.

These various Federal geospatial initiatives as well as active, continued geospatial database construction, technology maturation, standards development and expansion in other sectors of society suggest that the time is right for development of a more ambitious and focused geospatial policy that is national in scope. While a national geospatial policy is a more ambitious goal, effective development of Geospatial One Stop would provide an important component of the foundation for a national geospatial policy.

A. Issues, Challenges and Critical Success Factors

Issues and Challenges

There are a number of challenges relating to Geospatial One Stop that have been identified by the Best Practices Task Force to investigate and explore related geospatial best practices. Geospatial One Stop challenges are:

- *Challenge 1*: Involve state and local governments and the private sector in an effective Geospatial One Stop data standards development, data collaboration and portal design process while maintaining traceability to business requirements.
- *Challenge 2*: Facilitate improved geospatial data access and collaboration via the Geospatial One Stop portal and other mechanisms.
- *Challenge 3*: Develop policies regarding appropriate private sector use of the Geospatial One Stop portal.
- *Challenge 4*: Develop interoperable web GIS interfaces and services (e.g., mapping, analysis, etc) for the portal.
- *Challenge 5*: Anticipate user demands for geospatial data access through the portal.

The success of Geospatial One Stop is dependent on cooperation and collaboration between different agencies of the Federal Government; and between the Federal Government, State and local governments and the private sector, especially utilities. This cooperation and collaboration needs to occur on a number of levels including data standards development, geospatial database construction, development of geospatial data archives, and development of an interoperable geospatial data portal, which accesses data in archives maintained by various entities. This standards based, collaborative, interoperable Geospatial One Stop portal and related data archives also need to be sized and managed to support the performance requirements of its intended user organizations. Governance of the initiative is an issue because of the large number of involved organizations at various levels of the government and in the private sector.

Critical Success Factors

The following critical success factors, which must be addressed to ensure an effective project, have been identified for the initiative:

- *Effective Data Standards Development Process*. Data standards development efforts need clear links to business requirements as well as a dedicated and focused team using workshop techniques to meet project goals and timelines.

- *Geospatial Database and Data Archive Construction by Multiple Sectors*. Representatives from multiple levels of government and the private sector need to participate and collaborate in building geospatial databases and archives which would be made accessible through the portal to fully realize the promise of Geospatial One Stop.

- *Meet Public Needs for Increased Access to Geospatial Data*. The portal must provide expanded access to more comprehensive, current and detailed geospatial data to meet user requirements.

- *Interoperable Geospatial Portal with Web Mapping Services*. The geospatial data portal needs to support interoperable standards, provide web mapping services and an effective user interface for searching and accessing geospatial data.

B. Best Practices Found

The following best practices relating to geospatial data and portals were identified:

Collaborative Development of Geospatial Databases.
Geospatial data and GIS technologies have proven to be very valuable for users in varying levels of government and the private sector. However, use of the information has not fully reached its potential in government business processes. A constraint in wider use of GIS has been the high cost of building and maintaining Geospatial databases. Despite the high costs of Geospatial data, there is redundant geospatial database construction at different levels of government and in the private sector. Collaboration has sometimes allowed user organizations in multiple sectors to avoid this redundant geospatial database development.

Development of Geospatial Data Standards.
An additional constraint on broader cooperative use of geospatial data has been limited progress in the development of geospatial data standards. For Geospatial One Stop, standards need to be developed for the seven framework data types. Geospatial data standards are best practices that enable increased data sharing and collaboration within the geospatial data and GIS communities.

While significant standards progress has been made and interoperability has improved, many standards issues remain. The OpenGIS Consortium has coordinated development of interoperable and simple features standards for geospatial data and GIS. These standards efforts at the Federal level need to be aggressively accelerated and implemented to ensure success.

Development of Geospatial Data Portals to Provide Public Access to Geospatial Data. Geospatial data portals have improved significantly in recent years but are still in relatively early stages of development due mainly to lack of standards, the functionality limits of Internet GIS tools and performance limitations. ESRI's GeographyNetwork geospatial data portal (http://www.geographynetwork.com), the Department of Agriculture's (USDA) Resource Data Gateway, Microsoft's TerraServer (http://www.terraserver.com), the terrafly server (http://www.terrafly.com) and the GIS Data Depot (http://www.gisdatadepot.com) are best practice examples of portal development to increase use of geospatial data. The Internet functionality and performance limits are, however, technical issues that can be effectively addressed through continued standards development and improvements in software and technology.

Development of National Geospatial Data Initiatives. While beyond the scope of Geospatial One Stop, many of the Geospatial One Stop issues relate to development of a more coordinated and coherent geospatial data policy at a national level. Development of a national geospatial data policy with standardized, national coverage data at varying levels of detail is a best practice. The United Kingdom Ordnance Survey (http://www.ordnancesurvey.com), which has traditionally provided a comprehensive series of national maps, now provides a variety of types of geospatial data on a national basis. The data that is provided is detailed enough to meet the needs of local governments and utilities as well as the national government. The Ordnance Survey geospatial data is copyrighted and rights to use geospatial data are sold to user organizations. National geospatial data coverage guarantees that users will have access to data regardless of its location. It also ensures that geospatial data can be used on a comparative basis to evaluate alternative locations. For example, demographic data can be used to analyze the potential markets for store locations across the country.

II. BEST PRACTICE FINDINGS

A. Best Practice Findings to Meet the Challenges

Geospatial One Stop is both an ambitious business transformation project and an enabling information technology (IT) project. The Federal Government agencies that are involved in this initiative are responsible for construction of Geospatial databases for the seven framework data types. In addition, Federal agencies must build and maintain industrial strength Geospatial data archives, which can deliver framework Geospatial data rapidly and reliably to an anticipated Federal and non-Federal user base.

Challenge 1:
Involve state and local governments and the private sector in an effective Geospatial One Stop data standards development and collaboration process while maintaining traceability to business requirements.

Best Practice: Identify and Assess Geospatial Data Requirements and Develop Data Standards

It is critically important that business requirements for Geospatial data access through Geospatial One Stop be assessed in a detailed manner for each user community on an individual Geospatial data type basis. This involves determination of the following types of information by organization for each data type:

1. Spatial resolution requirements
2. Date or timeliness requirement
3. Cost limitations
4. Performance requirements to access and use data
5. Volume and timing of transactions that access data
6. Size of typical area of interest for a transaction
7. Comprehensive geographic area of interest

These requirements will vary by type of user and by organization. A detailed analysis is necessary both to assess the real potential for data collaboration as well as technical requirements for data, enterprise architecture and portal functionality.

As new sources of remotely sensed data are becoming available from innovative types of imaging sensors, proactive standards definition could also address changing sources of image data that need to be geocoded or fused in compatible ways with other types of image data. Geospatial data standards should address both relational and object relational data. Object relational data are increasingly used in GIS and have important advantages relative to more traditional relational data structures.

Geospatial data standards are best practices that enable increased data sharing and collaboration within the geospatial data and GIS communities. To support broad based data collaboration, multiple user organizations at Federal, State and local governments and in the private sector need

to be effectively involved in efforts to develop, define and approve geospatial data standards. While the most immediate need is to develop data standards for the seven framework data types, Geospatial One Stop would be improved by developing standards for other data types (e.g., soils, demographics, etc.) and including those data types within the portal.

Best practice geospatial data standards development examples include the Ordnance Survey OSMasterMap standards and the OpenGIS Consortium simple features standard.

Best Practice: Encourage and Support Multisector Geospatial Data Collaboration

The Federal Government has encouraged expanded cooperative use of Geospatial data through the National Spatial Data Infrastructure (NSDI), the Federal Geographic Data Committee, the United States Geological Survey (USGS) National Map Program and I-Teams. Cooperative funding of geospatial data construction between different levels of government and/or government and industry is a best practice. Cooperative funding of digital orthophotos by USDA, USGS and some states (e.g., Wisconsin) is a specific example of this best practice. Regional cooperation between utilities and local governments has also been successful in metropolitan Indianapolis, Montgomery County and Prince Georges County, Maryland in cooperation with the Washington Sanitary Sewer Commission and other locations.

Challenge 2:
Facilitate improved geospatial data access and collaboration via the Geospatial One Stop portal and other mechanisms.

Best Practice: Develop Geospatial Data Portals and Improve Access to Data

Geospatial data portals have been developed by Federal agencies, the private companies, state and local governments and universities over the last five years. These portals offer data that is accessible on-line as well as metadata for data that can be ordered for delivery at a later date. In some cases, geospatial data access fees are assessed while in other cases the data are available free. User interfaces vary from simple and friendly map based displays of the availability of data to more difficult tabular listings of geospatial metadata. All geospatial data portals, however, offer the user improved access to data that is expensive and time consuming to produce from traditional map and records sources. Examples of geospatial data portals include ESRI's GeographyNetwork, Microsoft's TerraServer, numerous state geospatial data portals and the USDA Resource Data Gateway.

Best Practice: Develop Effective Geospatial Portal User Interface and Functionality

Geospatial One Stop will serve various customers including other Federal agencies, State and local governments, private companies and citizens. The One Stop aspect of the initiative suggests that Geospatial One Stop will provide user-friendly access to various types of data in various locations. Best practices to find and access geospatial data include metadata standards and map displays of data availability as well as tabular listings. The user should also be able to constrain data searches by area of interest, type, date and scale. Some existing portals provide

limited ability to constrain geospatial data searches and deliver an overwhelming amount of data for the user to review to find the data that really meets their needs. The user should also be provided with the ability to order and receive data through a variety of means including on-line access, ftp downloads, and CDs.

Challenge 3:
Develop policies regarding appropriate private sector use of the Geospatial One Stop portal.

Best Practice: Provide Value Added Geospatial Data and Services

Some private sector firms will want to provide customer access to geospatial data that they publish through the portal. In many cases fees may be charged for access to published geospatial data. Firms also may want to publish links to value added services that use applications software and geospatial data, which may also be value added, to perform analytic tasks for customers. Examples of existing value added geospatial services and data include geodemographic market research services (e.g., Claritas) and routing and directions services which use digital street network data (e.g., MapQuest, Geographic Data Technology, Inc., Tele Atlas, etc.). These value added geospatial data sources and services all started with Bureau of Census data with investments as high as hundreds of millions of dollars to add value to this data and to develop applications to use the data. The examples show, however, that value added national geospatial data and services are a best practice that provides services to clients and increased revenue to government.

Challenge 4:
Develop interoperable web GIS interfaces and services (e.g., mapping, analysis, etc) for the portal.

Best Practice: Develop Interoperability Standards and Architecture

The nature of spatial systems is that they are widely distributed both within as well as amongst many public and private organizations. In order for the Geospatial One Stop Initiative to be successful it must therefore provide a means to link these widely distributed systems in a single network. The distribution of these systems is not just spatial but also logical and physical. A Geospatial One Stop architecture will be based on IT standards to support interoperability of both distributed users as well as producers/contributors of spatial content. Interoperability must be supported in two forms, first, *intersystem communication* and secondly, *intersystem exchange of content*.

Intersystem communication will require the use of a new standard for distributed systems—web services. Web services are self-contained and self-describing applications accessed via the Internet. Implementing Universal Description, Discovery and Integration (UDDI) as a standard way to describe web services, they utilize a second standard, eXtensible Markup Language (XML), for distributed systems communication. Web services are now a standard supported by the World Wide Web Consortium (W3C) and the International Standards Organization (ISO).

The second area of interoperability is *intersystem exchange of content*. Web services support communication but not specifically how and what information is exchanged. Industry standards for content models and data exchange formats are needed to complete the interoperability capabilities of the GeoSpatial One Stop system. Within the US and international communities, the National Spatial Data Infrastructure (NSDI) and Global Spatial Data Infrastructure (GSDI) activities have made significant advances in addressing the requirement for logical data model standards for key framework spatial layers, as well as, metadata standards for describing these framework layers. These activities have allowed a large range of users of geospatial data to provide input to the design and configuration of these content standards. FGDC specifically has executed these design reviews within the geospatial community over the last decade.

Challenge 5:
Anticipate and design to support operational user demands for geospatial data access through the portal.

Best Practice: Conduct Demand Analysis and Enterprise Performance Modeling

It is important that the operational business needs for geospatial data within Federal agencies be analyzed to assess the frequency of transactions that will access data through Geospatial One Stop. For example, requirements for digital orthophoto quads (DOQs) should be assessed so that the frequency of access, typical area of interest, seasonality of demand, need to view or download data, resolution and currency of the required image, etc. are all understood. This information is needed so that the portal and, more importantly, the geospatial data archives and bandwidth are all appropriately sized so that users will experience acceptable performance.

Discrete event simulation modeling can be employed by the technical architects to analyze alternative architectures in order to make best choices about various architectural components. These best practice methods have been effectively applied on the NASA Earth Observing System Data and Information System (EOSDIS) project, USDA Common Computing Environment (CCE) and other governmental and private sector projects.

Best Practice: Use Component Architectural Frameworks

Component Architect Frameworks reduce the overall effort for integration as well as reducing overall system life cycle costs (LCC). Architectural Frameworks have evolved and matured in the commercial sector over the past three years. (http://www.ichnet.org/). Moreover, most adhere to standards that limit specific technology lock in *and* more importantly, provide the ability to abstract Business Process Management (http://www.bpmi.org) from the technology. This is very significant and will usually allow the business user to establish and change processes (because business will change), without a ripple effect into the technology. The result is that IT infrastructure will enable process change and not hinder it.

Moreover, security has and can be incorporated to meet the guiding principles and government unique requirements. The Office of Management and Budget (OMB) recommends both Microsoft's .Net and Java2 Enterprise Edition (J2EE) as possible architectures for its 24

Quicksilver E-Gov projects. Both standards have been and are being widely used for E-Gov and e-commerce projects.

Best Practice: Provide for Business Continuity Geospatial Data Storage and Management

To take advantage of Moore's law for data storage, a best practice is to choose Redundant Arrays of Independent Disk Drives (RAID) systems that offer the greatest flexibility to incorporate future technology (disk drive sizes, network connection type, change in architecture) as the technology changes. Future changes and upgrades should be as nondisruptive as possible without needing to change the entire storage system every couple of years to meet new business demands. Also, low-end GIS storage systems that may work fine at the prototype, workgroup, and departmental level, often do not scale to meet enterprise needs for performance, reliability, and spike demand.

One of the primary lessons learned from the World Trade Center and Pentagon attacks in September 2001, from both the financial and military community, is the need for certain mission-critical data to be remotely mirrored to another geographic location. This is needed to both protect the data, which could be lost forever in a man-made or natural disaster, and provide continuous access to the information. Some mission-critical GIS data apparently was also lost or inaccessible following the attacks. First responders, such as police, fire, and local Federal Emergency Management Agency (FEMA) representatives, must have access to business or mission-critical GIS data during these crises. Inaccessibility to GIS data impacts their ability to carry out their primary roles and responsibilities hampering timely emergency response, and limits their ability to assess the situation at hand and make real-time, tactical decisions.

Best Practice: Provide Interoperable Geospatial Portal with Web Mapping Services

The Geospatial One Stop portal will need to support interoperable standards and interfaces to provide effective access to data stored on various data archives. Provision of web mapping services via the portal could also allow users to compose simple maps while accessing data from multiple archives. This ability to compose maps using data at various locations is a best practice that is provided by some GIS software tools (e.g., ESRI ArcMap). Web mapping services may also allow users to perform other simple processing and analysis tasks like generating buffers around a feature (e.g., 20 foot buffer around a road, etc.). Free, simple geospatial data viewing and analysis tools, an additional best practice supported by some GIS vendors, might also be made available via the portal to encourage more widespread use of the data by more casual users.

B. Critical Success Factors and Emerging Technology Opportunities

The following four critical success factors were identified for the Geospatial One Stop initiative:

1. Need for an Effective Geospatial Data Standards Development Process
2. Geospatial Database and Data Archive Construction
3. Meet Public Needs for Increased Access to Geospatial Data
4. Development of an Interoperable Geospatial Portal with Web Mapping Services

In order to take advantage of the best practices that have been discussed, a variety of types of barriers will need to be removed. In some cases these barriers relate to organizational and change management issues while in other cases the solution is emerging technology.

In recent years geospatial data and metadata standards have progressed on a number of fronts while the Internet has expanded options in myriad ways throughout the IT community. With current technology and GIS COTS products, users can sit at their desktops and conduct GIS analysis using a mix of geospatial data stored on their desktop with geospatial data accessed over the Internet. Standards for individual geospatial data types would improve user confidence in the data that are accessed and in some cases simplify use of that data.

Geospatial databases have been and are being built by multiple levels of government as well as some segments of the private sector (e.g., utilities). Many Federal agencies will build geospatial data archives to improve internal and public access to their data. The Geospatial One Stop portal could simplify access to this data by providing an effective user interface for querying geospatial data holdings and providing access to that data both on-line and through ftp download and CDROM ordering mechanisms. Web mapping services on the portal could provide the casual user with options to easily compose maps and perform simple geospatial data queries. Further standards development, geospatial database development, more intelligent geospatial searches and better performance in both IT and communications will continue to improve the user experience and value of accessing geospatial data through the portal.

III. CONCLUSIONS

A. Recommendations

1. Geospatial One Stop will need to involve Federal agencies, State and local governments, utilities and other private sector firms in development of geospatial data standards linked to business requirements.

2. Federal agencies responsible for construction of geospatial databases and data archives need support during their multiyear efforts to build these databases and archives. Analysis of demand for accessing geospatial data from these archives could help size these facilities to better support operational performance requirements for data access. Geospatial data archives should also be designed to support business continuity in the event of system failure or disaster.

3. Geospatial data cooperation and collaboration, which may include data sharing or joint funding of projects, between Federal agencies, State and local governments, utilities and other private sector firms should be encouraged.

4. The Geospatial One Stop portal should be based on a component enterprise architecture that adheres to existing and emerging information technology, geospatial data and web services standards.

5. The Geospatial One Stop portal should provide the user with effective and friendly means to search for and access geospatial data. In addition, some level of web mapping services functionality should be provided to allow users to compose maps and perform some level of analytic functionality.

B. Areas for Additional Study

Suggestions for topics that warrant additional study include the following:

- *Homeland Security, Geospatial Data and Geospatial One Stop*
  Geospatial One Stop could become a significant resource for Homeland Security. Collaboration from the utilities sector is critical to the success of this initiative in order to build Critical Infrastructure databases. More work is needed to explore the willingness of this sector to share data; it is also important to analyze requirements for data security. The full range of geospatial, image and CAD data that is required to make Homeland Security GIS a success should also be analyzed and identified.

- *Geospatial One Stop as an Enabler of Other E-Gov Initiatives*
  Geospatial One Stop can enable other E-Gov initiatives that require or could use geospatial data. For example, Recreation One Stop might use both geospatial data and web mapping services from Geospatial One Stop. Alternatively, the e-Loans portal might support farm loans, which require analysis of geospatial data for eligibility screening.

- *Market and Performance Analysis for Geospatial Data Archives*
  Geospatial One Stop will be a portal to geospatial data that is stored on data archives that will be operated by Federal agencies and other organizations. It is important to analyze the probable demand for various types of data from other Federal agencies as well as the public to more effectively size these archives. Sizing and scalability will be critical for performance which will be needed to support the operational business requirements of Geospatial One Stop.

APPENDIX A. TEAM MEMBERS AND METHODOLOGY

The Industry Advisory Council (IAC) Geospatial One Stop Best Practices Task Force prepared this report. This Task Force was formed at OMB request with corporate members of the Federal Government Information Processing Council (FGIPC). The purpose of the Best Practices E-Gov task forces are to review the plans for the various Presidential Priority E-Gov initiatives and offer recommendations to improve them based on industry best practices.

The Industry Advisory Council (IAC) Geospatial One Stop Task Force members were derived from systems integration, software and data storage firms. Members had both geospatial and E-Gov expertise. The task force held a series of meetings and/or teleconferences to review the Geospatial One Stop initiative. Meetings were also held with the two government sponsors: Scott Cameron, the Deputy Assistant Secretary for Performance and Management of the Department of the Interior, and John Moeller, the Director of the Federal Geographic Data Committee (FGDC). Dennis Lytle of USDA, who served as the Task Force government lead, also met with the Task Force as a group and with Don Morris-Jones, the task force industry lead. Task force members also attended a March 5, 2002 public meeting regarding Geospatial One Stop that addressed goals and objectives for the program.

The following organizations and individuals were members of this task force:

Primary Contributors

- American Management Systems, Inc.: Don Morris-Jones (Industry Lead) and Jim Ward
- Computer Sciences Corporation: Rob Rhode Jr.
- EMC: Jim Young
- IBM: Kathleen Hirning and David Beddoe

Secondary Contributors

- Microsoft: Brad Heidemann
- Oracle: Scott Adkins and Steve Cooperman
- Federal Liaison - USDA: Dennis Lytle (Government Lead)

The methodology for this study relied on application of systems development methodology and best practices to the Geospatial One Stop project. As Geospatial One Stop is an E-Gov project, E-commerce and E-Gov methods and best practices were considered to be most applicable. As geospatial data and GIS technologies standards are still largely under development, the continuing need to develop standards was also considered critical. Management of geospatial data also presents some unique challenges relative to management of more conventional types of business data. These issues were also considered in development of our recommendations and identification of best practices.

APPENDIX B. BEST PRACTICE INFORMATION SOURCES

The corporations that participated in this study all maintain proprietary systems development and best practices methodologies (e.g., CSC Catalyst, AMS Best Practices, etc.). The individuals who conducted this report are trained in these corporate methodologies and relied on their training, experience and lessons learned in formulating recommendations for this study. Due to the proprietary nature of these methodologies, publicly available references cannot be cited.

Corporate websites providing high-level discussion of methodologies:
AMS: www.ams.com
CSC: www.csc.com
EMC: www.emc.com
IBM: www.ibm.com
Microsoft: www.microsoft.com
Oracle: www.oracle.com

The U.S. Federal Government develops and publishes methodologies that were used in this study. For example, the CIO Council Enterprise Architecture methodology was a useful reference.

United Kingdom Ordnance Survey: www.ordnancesurvey.com
Federal Geographic Data Committee: www.fgdc.gov
The following geospatial data portals are also referenced:
TerraServer: http://www.terraserver.com
Terrafly: http://www.terrafly.com
GIS Data Depot: http://www.gisdatadepot.com
Geography Network: http://www.geographynetwork.com
Georgia GIS: http://www.gis.state.ga.us
California GIS: http://www.gis.ca.gov
South Carolina GIS: http://www.dnr.state.sc.us/gisdata
Tennessee GIS: http://www.tngis.org
Montana GIS: http://nris.state.mt.us/gis/gis.html
Maryland GIS: http://www.mdp.state.md.us/GIS/mdmaps.htm
USDA Resource Data Gateway: http://lighthouse.nrcs.usda.gov/gateway
NASA EOSDIS: http://eos.nasa.gov/eosdis